

**New hard material-reinforced stabilised zirconia ceramic****Publication number:** DE19733700**Publication date:** 1998-04-16**Inventor:** KRELL ANDREAS DR (DE); BLANK PAUL DR (DE)**Applicant:** FRAUNHOFER GES FORSCHUNG (DE)**Classification:****- international:** C04B35/488; F16C33/04; F16C33/30; C04B35/486;  
F16C33/04; F16C33/30; (IPC1-7): C04B35/48;  
C04B35/488; F16C33/12; F16C33/62**- european:** C04B35/488; F16C33/04C; F16C33/30**Application number:** DE19971033700 19970804**Priority number(s):** DE19971033700 19970804; DE19961040923 19961004[Report a data error here](#)**Abstract of DE19733700**

A novel, hard material-reinforced, stabilised ZrO<sub>2</sub> ceramic, with mechanical stability under hydrothermal conditions, has the composition (by vol.) 5-50% hard material component with 0.2-1  $\mu$ m grain size, 2-45% Al<sub>2</sub>O<sub>3</sub> with 0.1-1  $\mu$ m grain size and balance (1-30%) stabilised ZrO<sub>2</sub> phase with a solid solution of 2-3.5 mol% Y<sub>2</sub>O<sub>3</sub> and 1-7 mol% CeO<sub>2</sub> (based on the ZrO<sub>2</sub> content in the starting powder composition) and with 0.2-0.7  $\mu$ m grain size. Production of the above ceramic involves: (a) providing a ZrO<sub>2</sub> powder which contains Y<sub>2</sub>O<sub>3</sub> in solid solution and which is doped with Ce with high spatial distribution homogeneity wrt. the ZrO<sub>2</sub> particles, this homogeneity being fixed for the subsequent process steps without significantly modifying the electrokinetic properties at the ZrO<sub>2</sub> particle surfaces; (b) subjecting this ZrO<sub>2</sub> powder, of less than 0.5  $\mu$ m mean particle size, to wet mixing and grinding together with a hard material component of less than 5  $\mu$ m mean particle size and Al<sub>2</sub>O<sub>3</sub> of less than 0.7  $\mu$ m mean particle size, with addition of the requisite organic pressing aid and sintering additive; and (c) moulding and sintering the resulting mixture. Preferably, the hard material component is TiC of any stoichiometry. The stabilised ZrO<sub>2</sub> preferably has a primary particle size of 10-60 nm and the Al<sub>2</sub>O<sub>3</sub> preferably contains  $\leq$  2% coarse particles of greater than 2  $\mu$ m size. The sintering additive preferably comprises 2-10 wt.% TiH<sub>2</sub>.

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